SELF-CONFIDENCE, ADJUSTMENT AND PARENT-CHILD RELATIONSHIP OF DYSCALCULIC ELEMENTARY SCHOOL STUDENTS

A
SYNOPSIS

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INTRODUCTION

Today's world requires us to process unprecedented levels of numerical information. Computers, smart phones ,financial and health care information processing are just a few of the many contemporary demands requiring our numerical fluency. Thus it is essential , for continued development of effective quantitative learning and mathematical education methods, that we understand the source of such widespread and debilitating numerical and mathematical impairment.

The use of the word ***dyscalculia*** can generate heated debate about 'diagnosis', concerns about labelling children and the need for specialist support. There is much debate as to what dyscalculia is, whether and when the term should be used; and whether it should be seen as a separate disorder or the lower end of a continuum of ability or achievement in mathematics (Dowker, 2009). Our present understanding of dyscalculia and its effect on learning mathematics is more limited than our understanding of dyslexia and its effect on literacy. Dyscalculia might also be seen as a specific learning difficulty in maths Not all students who display low mathematical ability have dyscalculia, as this could be due to a range of causes, for example: low attendance, general learning difficulties, language disorder, poor teaching methods or sensory processing difficulties. It is therefore necessary to rule out other causes before arriving at an identification of dyscalculia. The characteristics of dyscalculia may overlap with those of dyslexia, or other specific learning difficulties; many, but not all, dyslexic learners also have resultant difficulties in mathematics. Learners may, of course, have both dyslexia and dyscalculia. Like dyslexia, dyscalculia is not caused by poor or interrupted teaching, nor by low intelligence, although both of these may result in the appearance of characteristics similar to those of dyscalculia. However, dyscalculia appears to be a difference relating specifically to arithmetical skills. This means that purely dyscalculic learners do

not have the difficulties with language that are associated with dyslexia. In fact, their language ability may be above average. (See Appendix 6)

Definition

'Dyscalculia' is derived from the Greek and means literally 'difficulty with counting'. There is no one agreed definition of dyscalculia and, despite considerable research, the findings regarding the numbers of pupils and causes of dyscalculia vary widely.

Current definitions are primarily descriptions of the characteristics of particular learners. They offer little help to practitioners in understanding the causes, but there is some evidence to suggest that dyscalculia is a brain-based disorder with a genetic predisposition (Shalev and Gross-Tsur (2001). There is some agreement that dyscalculic learners have a poor concept of numerosity, demonstrated by a deficit in **subitising**. This is the ability to know, from a brief glance and without counting, how many objects there are in a small group. It is an innate ability, present in human infants from birth. Some medical conditions are associated with dyscalculia: Turners Syndrome, a genetic condition more prevalent in females, is associated with mild dyscalculia; and Gerstmann's Syndrome, which also includes an inability to count fingers or point accurately, right/ left disorientation, poor writing and inability to copy letters, is associated with severe dyscalculia. (Squires 2004). Individuals can also acquire dyscalculia through brain injury.

Definitions include:

'A cognitive disorder of childhood affecting the ability of an otherwise intelligent child to learn arithmetic' Ta'ir, Brezner and Ariel (1997).

'Dyscalculia is characterised by incomplete procedural knowledge and inefficient strategies to solve numerical problems.' Shalev and Gross-Tsur (2001).

‘Educational psychologists might want to adopt the scientifically less interesting but educationally more useful approach of taking dyscalculia by its literal meaning (an inability to calculate). They can then start from the assumption that all children who struggle with numbers or the number system are to some extent dyscalculic.’ Gross (2007), p.5

‘The term ‘dyscalculia’ is contentious. Does it relate to a discrete difficulty or part of a continuum? Should the criteria of discrepancy between IQ and mathematical ability be used? Should mathematical difficulties be seen as related to dyslexia and language difficulties (but evidence suggests that they can sometimes be dissociated) … Arithmetic is NOT a single unitary ability’. Dowker (2009).

While we recognise other definitions of dyscalculia, for our working practices the Service will use the following definition of dyscalculia, which is currently recognised by the Department for Education:

‘A condition that affects the ability to acquire arithmetical skills. Dyscalculic learners may have difficulty understanding simple number concept, lack an intuitive grasp of number, and have problems learning number facts and procedures. Even if they produce a correct answer, or use a correct method, they may do so mechanically and without confidence.’ DfES (2001)

It goes on to state:

‘Very little is known about the prevalence of dyscalculia, its causes or treatment. Purely dyscalculic learners who have difficulties only with number will have cognitive and language abilities within the normal range, and may excel in nonmathematical subjects.’

What Are the Effects of Dyscalculia?

Disabilities involving math vary greatly. So, the effects they have on a person's development can vary just as much. For instance, a person who has

trouble processing language will face different challenges in math than a person who has trouble with visual-spatial relationships. Another person may have trouble remembering facts and keeping a sequence of steps in order. This person will have yet a different set of math-related challenges to overcome.

For individuals with visual-spatial troubles, it may be hard to visualize patterns or different parts of a math problem. Language processing problems can make it hard for a person to get a grasp of the vocabulary of math. Without the proper vocabulary and a clear understanding of what the words represent, it is difficult to build on math knowledge.

When basic math facts are not mastered earlier, teens and adults with dyscalculia may have trouble moving on to more advanced math applications. These require that a person be able to follow multi-step procedures and be able to identify critical information needed to solve equations and more complex problems.

What Are the Warning Signs of Dyscalculia?

Having trouble learning math skills does not necessarily mean a person has a learning disability. All students learn at different paces. It can take young people time and practice for formal math procedures to make practical sense. So how can you tell if someone has dyscalculia? If a person continues to display trouble with the areas listed below, consider testing for dyscalculia. Extra help may be beneficial.

Dyscalculia: Warning Signs By Age

Young Children Trouble With:	**School-Aged Children Trouble With:**	**Teenagers and Adults Trouble With:**
Difficulty learning to count Trouble recognizing printed numbers Difficulty tying together the idea of a number (4) and how it exists in the world (4 horses, 4 cars, 4 children) Poor memory for numbers Trouble organizing things in a logical way - putting round objects in one place and square ones in another	Trouble learning math facts (addition, subtraction, multiplication, division) Difficulty developing math problem-solving skills Poor long term memory for math functions Not familiar with math vocabulary Difficulty measuring things Avoiding games that require strategy	Difficulty estimating costs like groceries bills Difficulty learning math concepts beyond the basic math facts Poor ability to budget or balance a checkbook Trouble with concepts of time, such as sticking to a schedule or approximating time Trouble with mental math Difficulty finding different approaches to one problem

How Is Dyscalculia Identified?

When a teacher or trained professional evaluates a student for learning disabilities in math, the student is interviewed about a full range of math-related skills and behaviors. Pencil and paper math tests are often used, but an evaluation needs to accomplish more. It is meant to reveal how a person understands and uses numbers and math concepts to solve advanced-level, as well as everyday, problems. The evaluation compares a person's expected and actual levels of skill and understanding while noting the person's specific strengths and weaknesses. Below are some of the areas that may be addressed:

- Ability with basic math skills like counting, adding, subtracting, multiplying and dividing
- Ability to predict appropriate procedures based on understanding patterns—knowing when to add, subtract, multiply, divide or do more advanced computations
- Ability to organize objects in a logical way
- Ability to measure—telling time, using money
- Ability to estimate number quantities
- Ability to self-check work and find alternate ways to solve problems.

How Is Dyscalculia Treated?

Helping a student identify his/her strengths and weaknesses is the first step to getting help. Following identification, parents, teachers and other educators can work together to establish strategies that will help the student learn math more effectively. Help outside the classroom lets a student and tutor focus specifically on the difficulties that student is having, taking pressure off moving to new topics too quickly. Repeated reinforcement and specific practice of straightforward ideas can make understanding easier. Other strategies for inside and outside the classroom include:

- Use graph paper for students who have difficulty organizing ideas on paper.
- Work on finding different ways to approach math facts; i.e., instead of just memorizing the multiplication tables, explain that 8 x 2 = 16, so if 16 is doubled, 8 x 4 must = 32.
- Practice estimating as a way to begin solving math problems.
- Introduce new skills beginning with concrete examples and later moving to more abstract applications.
- For language difficulties, explain ideas and problems clearly and encourage students to ask questions as they work.
- Provide a place to work with few distractions and have pencils, erasers and other tools on hand as needed.

Help students become aware of their strengths and weaknesses. Understanding how a person learns best is a big step in achieving academic success and confidence.

REVIEW OF RELATED LITERATURE

Badian,and Ghublikian (1983), in a study The Personal-Social Characteristics of Children With Poor Mathematical Computation Skills found that factor analysis showed that the eight behaviors split into two factors: Factor I—responsibility and Factor II—social cooperation. The low math group was significantly lower than the other two groups on Factor I and the total scale but not on Factor II. Group differences occurred only among boys. It was concluded that children with a disability in mathematical computation may be at risk for impulsive and possibly antisocial behavior.

Shah (1985) studied Dyscalculia amongst first graders of Choryasi Block: a Psychometric Exploration and found that children were found suffering from the following misconcepts and errors:(a) Applications of the knowledge

(they considerably failed to take the decision about the process, whether to make addition or subtraction). On item testing application of knowledge , they claimed only 0.70 mean score (out of 10 marks). On anoyher application type test items they secured a mean score of 1.26 (out of 10 marks).(b) the children had the habit of answering the question without understanding and pre thinking.(c) due to poor grasp of words a nd language children failed to write the numbers in words and vice versa . they gained 2.6 mean score (out of 10 marks). It was found that they knew the answer and they could identify the numbers correctly but because of lack of expression they could not write the answer in words .

Cosson, (2000) studied Understanding dissociations in dyscalculia found that cerebral networks for number processing. Rote arithmetic operations with small numbers have a greater reliance on left-lateralized regions, presumably encoding numbers in verbal format. Approximation and exact calculation with large numbers, however, put heavier emphasis on the left and right parietal cortices, which may encode numbers in a non-verbal quantity format. Subtypes of dyscalculia can be explained by lesions disproportionately affecting only one of these networks.

Shalev and Gross (2001) in a study Developmental dyscalculia found that Developmental dyscalculia is a common cognitive handicap; its prevalence in the school population is about 5-6%, a frequency similar to those of developmental dyslexia and attention-deficit-hyperactivity disorder. Unlike these, however, it is as common in females as in males. Developmental dyscalculia frequently is encountered in neurologic disorders, examples of which include attention-deficit-hyperactivity disorder, developmental language disorder, epilepsy, and fragile X syndrome. The long-term prognosis of developmental dyscalculia is unknown; it appears, however, to persist, at least for the short-term, in about half of affected preteen children. The consequences

of developmental dyscalculia and its impact on education, employment, and psychologic well-being of affected individuals are unknown.

Landerl (2003) in a study Developmental dyscalculia and basic numerical capacities found that Children with dyscalculia only had impaired performance on the tasks despite high-average performance on tests of IQ, vocabulary and working memory tasks. Children with reading disability were mildly impaired only on tasks that involved articulation, while children with both disorders showed a pattern of numerical disability similar to that of the dyscalculic group, with no special features consequent on their reading or language deficits. We conclude that dyscalculia is the result of specific disabilities in basic numerical processing, rather than the consequence of deficits in other cognitive abilities.

Monuteaux , et.al (2005) in a study ADHD and Dyscalculia found that found elevated rates of ADHD in relatives of both ADHD proband groups, regardless of dyscalculia status, and elevated rates of dyscalculia in relatives of probands with dyscalculia, irrespective of ADHD status. There was no evidence for cosegregation or assortative mating. Our findings support the hypothesis that ADHD and dyscalculia are independently transmitted in families and are etiologically distinct. These results reinforce the current nosological approach to these disorders and underscore the need for separate identification and treatment strategies for children with both conditions.

Temple,_ (2007) in a study Procedural Dyscalculia and Number Fact Dyscalculia: Double Dissociation in Developmental Dyscalculia found that there are individual differences in the developmental dyscalculias consistent with individual differences in the developmental pathways to the adult calculation system. It also-demonstrates that the developmental dyscalculias are anala-gous to the acquired dyscalculias.

Rotzer, et. al (2008) in a study Dysfunctional neural network of spatial working memory contributes to developmental dyscalculia found that for the first time an involvement of spatial working memory processes in the neural underpinnings of DD. These poor spatial working memory processes may inhibit the formation of spatial number representations (mental numberline) as well as the storage and retrieval of arithmetical facts.

Rubinsten and Tannock (2010) in a study Mathematics anxiety in children with developmental dyscalculia found that Participants with DD responded faster to targets that were preceded by both negative primes and math related primes. A reversed pattern was present in the control group. The results reveal a direct link between emotions, arithmetic and low achievement in math. It is also suggested that arithmetic-affective priming might be used as an indirect measure of math anxiety.

Butterworth et. al ,(2011) in a study Dyscalculia: From Brain to Education found that Recent research in cognitive and developmental neuroscience is providing a new approach to the understanding of dyscalculia that emphasizes a core deficit in understanding sets and their numerosities, which is fundamental to all aspects of elementary school mathematics. The neural bases of numerosity processing have been investigated in structural and functional neuroimaging studies of adults and children, and neural markers of its impairment in dyscalculia have been identified. New interventions to strengthen numerosity processing, including adaptive software, promise effective evidence-based education for dyscalculic learners.

Ashkenazi, et.al (2012) studied Do subitizing deficits in developmental dyscalculia involve pattern recognition weakness? And found that a deficit in the subitizing and small estimation range among DD participants in relation to controls. There are indications that subitizing is

based on pattern recognition, thus presenting dots in a canonical shape in the estimation range should result in a subitizing-like pattern. In line with this theory, our control group presented a subitizing-like pattern in the small estimation range for canonically arranged dots, whereas the DD participants presented a deficit in the estimation of canonically arranged dots. The present finding indicates that pattern recognition difficulties may play a significant role in both subitizing and subitizing deficits among those with DD.

Fias, et.al, (2013) studied Trends in Neuroscience and Education: Multiple components of developmental dyscalculia found Unresolved controversies regarding the functional impairments at the origin of dyscalculia, including working memory, approximate number system and attention have pervaded the field of mathematical learning disabilities. These controversies are fed by the tendency to focus on a single explanatory factor. We argue that we are in need of neurocognitive frameworks involving multiple functional components that contribute to inefficient numerical problem solving and dyscalculia.

NEED AND SIGNIFICANCE

Dyscalculia is a specific learning disability affecting the acquisition of the arithmetic skills in an otherwise normal child although poor teaching environmental Deprivation and low Intelligence have been implicated in the etiology of Dyscalculia, current data indicates that this learning disability is a brain based disorder with a familial-genetic predisposition. Till now people haven’t been widely tested for Dyscalculia, it is hard to quantify exactly how many people have the condition. It is probably about as common as dyslexia, which affects approx. 5% of the population.

Recent studies of over 1000 English Children showed that 36 of them with otherwise normal ability had specific learning disabilities in maths. This equates to approximately one pupil per class in the average school. Considering Dyscalculia as a common cognitive handicap, its prevalence in the school population is about 5-6%, a frequency similar to those of developmental dyslexia and attention deficit hyper activity disorder unlike these however it is as common n females as in males. The long term prognosis of Dyscalculia is unknown .it appears however to persist at least for the short term in about half of affected preteen children. The Consequences of Dyscalculia and its impact on education and psychologic well being of affected individual are unknown.

Thus considering the novelty and importance of Dyscalculia in teaching-learning process, the present study explains the dyscalculia as the important learning disability in relation to Self-Confidence, Adjustment and Parent-Child Relationship.

STATEMENT OF THE PROBLEM

The study proposed to be undertaken by the investigator is stated as follows:

"***Self-Confidence, Adjustment and Parent-Child relationship of Dyscalculic Elementary School Students"***

OPERATIONAL DEFINITION OF TERMS

The present study involves the following key terms which operationally defined as below:

1. **Dyscalculia**

It is a specific learning disability (SpLD) that affects a person's ability to acquire arithmetical skills. It can manifest itself as a person's inability to understand basic number concepts and/or number

relationships, recognize symbols, and comprehend quantitative and spatial information.

Dyscalculia is a structural disorder of mathematical abilities which has its origin in a genetic or congenital disorder in those parts of the brain that are the anatomical-physiological substrate of the maturation of the mathematical abilities adequate to age, without a simultaneous disorder of general mental functions.

2. Self-Confidence

Self-confidence comes from an attitude where you Promise yourself, no matter how difficult the problem life throws at you, that you will try as hard as you can to help yourself. You acknowledge that sometimes your efforts to help yourself may not result in success, as often being properly rewarded is not in your control.

3. Adjustment

Adjustment may be defined as a process of altering behavior to reach a harmonious relationship with the environment. When people say they are in an “adjustment period” they typically mean they are going through a process of change and are searching for some level of balance or acceptance with the environment, others, or themselves.

4. Parent-Child Relationship

A characteristic behaviour of parents is experienced by their children is taken as the measure of parent-child relationship. The following ten dimensions are taken into consideration in order to study the behavioural relationship between parents and children

(1) *Protecting* (PRO) the defending attitude overtly expressed in the act of guarding ,sheltering and shielding the child from situations or experiences perceived to be hostile , oppressing and harmful.

(2) *Symbolic punishment*(SP) : It is a symbolic expression of anger by which parents show their temporary annoyance with the child .

(3) *Rejecting* (REJ) Behaviour evident in renouncing the child in aversion. The disposition is indicated being disdainful and in outright refusal of the child.

(4) *Object punishment*(OP) : Physical means by which parents show their temporary annoyance with the child.

(5) *Demanding (*DEM): Expression of authority and claim with imperious command over the child, executed in the exercise of overall control .

(6) *Indifferent* (IND): The expression of unconcerned ,apathetic ,passive behaviour and functioning without either importance or interest in child.

(7) *Symbolic reward*(SR): Symbolic reward is the symbolixc expression of appreciation for emotional and psychological security of the child, this indicate parent acceptance of the child.

(8) *Loving* (LOV): Expression of fondness, devoted attachment and amiableness shown to the child.

(9) Object reward (OR): Concrete action of warmth, both symbolic and object revolt indicate parents acceptance of the child which is a precursor for the child to achieve aspire and advance.

(10) Neglecting (NEG): A careless slighting treatment indicated accustomed omission and deliberate disregard towards the child, which might leave the child to devalue himself.

OBJECTIVES:

1. To identify Dyscalculic Elementary School students with the help of Arithmetic Ability Test.
2. To compare the Self-Confidence of identified Dyscalculic Elementary School students in relation to their:
   i. Gender (Male/ Female)
   ii. Locality (Urban/Rural)
   iii. Birth Order
3. To Compare the Adjustment of identified Dyscalculic Elementary School students in relation to their:
   i. Gender (Male/ Female)
   ii. Locality (Urban/Rural)
   iii. Birth Order
4. To Compare the Father- Child relationship of identified Dyscalculic Elementary School students in relation to their:
   i.Gender (Male/ Female)
   ii. Locality (Urban/Rural)
   iii.Birth Order
5. To Compare the Mother - Child relationship of identified Dyscalculic Elementary School students in relation to their:
   i. Gender (Male/ Female)
   ii. Locality (Urban/Rural)
   iii. Birth Order
6. To carry out twenty case studies of Dyscalculic students having severe problem.

HYPOTHESES:

1. There will be no significant difference in Self- Confidence of identified Dyscalculic Elementary School students in relation to their:

   i. Gender (Male/ Female)

   ii. Locality (Urban/Rural)

   iii. Birth Order

2. There will be no significant difference in Adjustment of identified Dyscalculic Elementary School students in relation to their:

   i. Gender (Male/ Female)

   ii. Locality (Urban/Rural)

   iii. Birth Order

3. There will be no significant difference in Father- Child relationship of identified Dyscalculic Elementary School students in relation to their:

   i. Gender (Male/ Female)

   ii. Locality (Urban/Rural)

   iii. Birth Order

4. There will be no significant difference in Mother- Child relationship of identified Dyscalculic Elementary School students in relation to their:

   i. Gender (Male/ Female)

   ii. Locality (Urban/Rural)

   iii Birth Order

DELIMITATIONS OF THE STUDY:

Delimiting a problem is very important step. The delimitation may help the researcher for conducting the study and the findings of studies also confine to the delimitations.

The present study has delimited to the following conditions:

1. The study will be delimited to 1500 students of 8th stage.
2. The study will be delimited to Shimla District of Himachal Pradesh
3. The study will be delimited to Elementary School students

METHODOLOGY:

1. Sample:

The present study will be targeted at all the students of 8^{th} class of Elementary school of Shimla District. However owing to obvious constraints of the field situation, it will not be feasible to encompass the entire accessible population. Hence it is advisable to employ multi-stage Random sampling.

First of all, out of six educational blocks, three blocks will be selected randomly. For random sampling the selection of blocks and schools, the lottery method will be followed. After the selection of schools Arithmetic Ability Test will be administered to all the students of 8^{th} Class and dyscalculic pupils will be identified. All the identified population of dyscalculic students will be subjected to tests namely Self Confidence, Adjustment and Parent- Child Relationship.

2. Method:

The present study is the combination of survey method, descriptive research and case study.

3. Procedure for data collection:

The data will be collected by the investigator by personally visiting and administration of the tests.

4. Tools:

In the present study, tests to be used for the purpose are as follows:

1) Arithmetic Ability Test to be prepared by the investigator.
2) Self-confidence Scale by Rekha Agnihotri.
3) Adolescent adjustment Scale by U.Prateek and others.
4) Parent-Child Relationship Scale to be prepared by the investigator.
5) Interview Schedule for parents of identified Dyscalculic Elementary School students.

5. Statistical Techniques used:

In the present study, to test the hypotheses, means, standard deviation and t-test and appropriate tests will be used.

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